PHYSICS ABSTRACTS

BEING

SCIENCE ABSTRACTS—SECTION A

VOL. 46

1943

EDITED AND ISSUED BY

THE INSTITUTION OF ELECTRICAL ENGINEERS

SAVOY PLACE, VICTORIA EMBANKMENT, LONDON, W.C.2

IN ASSOCIATION WITH

THE PHYSICAL SOCIETY

THE AMERICAN PHYSICAL SOCIETY

THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

CONTENTS

		Page
List of Journals		iii
List of Abstractors		vi
Note on the Universal Decimal Classification		vii
Abridged Tables of Sections 51, 52, 53		vii
Abstracts:		
016	Bibliography 153	
16	Logic 81, 153	
31	Statistics 105	
358.4	Military air service 225	
389	Standardization 81	
51	Mathematics 1, 29, 45, 65, 81, 105, 129, 153, 177, 193, 209, 225	
52	Astronomy. Geodesy 1, 29, 46, 65, 82, 106, 129, 154, 177, 193, 210, 226	
53	Physics: General 3, 30, 49, 65, 83, 108, 131, 155, 180, 194, 212, 228	
531	Mechanics 4, 31, 50, 66, 83, 108, 131, 155, 180, 194, 213, 228	
532	Liquids. Hydrostatics. Hydrodynamics 5, 31, 50, 67, 84, 109, 132, 156, 180, 194, 213, 229	
532.13	Viscosity 156, 180, 194, 213, 229	
532.6	Surface tension 6, 31, 51, 67, 84, 110, 132, 157, 181, 194, 214, 230	
532.7	Solutions. Osmosis 6, 32, 68, 85, 111, 132, 157, 181, 195, 214, 230	
533	Gases. Aerodynamics 7, 32, 52, 68, 85, 112, 133, 158, 182, 195, 214, 230	
533.7	Kinetic theory 182, 196	
534	Sound. Vibrations 7, 32, 52, 68, 85, 112, 133, 159, 182, 196, 214, 230	
535	Optics 7, 32, 53, 69, 86, 113, 134, 159, 182, 196, 215, 232	
535.24	Photometry 8, 32, 53, 69, 86, 113, 134, 159, 196, 232	
535.3	Reflection. Refraction 8, 33, 53, 69, 86, 113, 134, 160, 182, 196, 215, 233	
535.33	Spectra 8, 33, 53, 69, 86, 114, 135, 161, 182, 196, 216, 233	
535.34	Absorption 9, 54, 70, 87, 114, 136, 161, 183, 196, 216, 234	
535.37	Luminescence 9, 54, 70, 87, 115, 137, 162, 183, 197, 216, 234	
535.4	Interference. Diffraction 11, 33, 55, 88, 116, 137, 183, 197, 216, 235	
535.5	Polarization 12, 55, 88, 116, 137, 162, 183, 235	
535.6	Colour 12, 33, 55, 71, 88, 117, 137, 163, 197, 216, 235	
535.7	Vision 13, 33, 55, 89, 117, 137, 163, 183, 197, 216, 236	
535.8	Instruments 13, 89, 118, 138, 163, 216, 236	
536	Heat 13, 33, 56, 71, 89, 118, 138, 163, 184, 198, 217, 236	
536.7	Thermodynamics 14, 34, 57, 72, 91, 119, 139, 164, 184, 217, 237	
537	Electricity 14, 34, 57, 72, 91, 119, 139, 164, 185, 199, 217, 237	
537.5	Electric discharge 238	
537.531	X-rays 16, 35, 58, 73, 120, 140, 185, 199, 238	
537.533	Cathode rays. Electron emission 16, 35, 59, 73, 92, 121, 140, 165, 185, 217, 238	
537.534	Positive rays 17, 35, 73, 92, 141, 165, 185	
537.56	Ionization of gases 218	
537.591	Cosmic rays 17, 35, 59, 73, 92, 141, 165, 185, 199, 239	
537.7	Electrical measurements 92, 121	
538	Magnetism. Electromagnetism 17, 36, 60, 73, 93, 121, 141, 165, 186, 200, 218, 239	
538.56	Electromagnetic oscillations 200, 218, 239	
538.6	Effects on magnetic fields. Effects of magnetic fields 36, 60, 73, 93, 121, 141, 186, 201, 239	
538.7	Terrestrial magnetism (Physics) 142, 166, 218	
539	Molecules and atoms 18, 36, 60, 73, 93, 121, 142, 166, 186, 201, 218, 239	
539.16	Radioactivity 19, 36, 60, 73, 94, 122, 143, 167, 186, 201, 218, 240	
539.17	Atomic disintegration 20	
539.185	Neutrons 95, 122, 143, 186, 240	
539.2	Molecular systems 20, 37, 61, 74, 95, 122, 143, 167, 187, 202, 219	
539.26	X-ray examination 22, 37, 62, 74, 96, 123, 169, 187, 202, 219, 241	
539.3/.4	Elasticity. Strength 22, 37, 62, 74, 96, 123, 143, 169, 187, 202, 219, 241	
539.5	Deformability. Ductility. Hardness 23, 37, 63, 97, 144, 188, 242	
539.501	Rheology 124, 144, 187, 203, 220, 242	
539.6	Friction 24, 75, 97, 145, 220	
541	Physical chemistry 24, 38, 63, 76, 97, 124, 145, 170, 188, 204, 220, 242	
548	Crystallography 28, 39, 64, 79, 102, 127, 151, 173, 191, 207, 223, 246	
55	Geophysics 28, 40, 64, 80, 102, 128, 151, 174, 191, 207, 223, 247	
550.38	Terrestrial magnetism (Geophysics) 40, 64, 102, 128, 151, 174, 207, 223	
551.5	Meteorology 28, 41, 64, 80, 103, 128, 152, 175, 191, 208, 224, 247	
552	Petrology 152	
553	Economic geology 64, 176, 224	
57	Biology 28, 80, 104, 128, 152, 208	
577.3	Biophysics 44	
58	Botany 80, 128, 208	
591	Animal biology 80, 104, 128, 152, 192, 208, 224, 248	
591.12	Respiration 28	
591.17	Animal flight 64	
61	Medical science 104, 128, 152	
611.8	Nervous system 176	
612	Physiology 64, 192, 208, 224, 248	
614.7	Hygiene 248	
615	Therapy 128	
615.9	Toxicology 249	
616	Pathology 224	
621.34	Electric drives 104	
621.78	Heat treatment of metals 28	
622	Mining 152	
623.4	Weapons 249	
63	Agriculture 44, 80, 152, 224	
632	Insect pests 128	
66	Industrial chemistry 249	
661.713	Cellulose 44, 64, 176	
663.632.4	Water softening 192	
666	Glass 28, 44, 64, 128, 152, 208, 249	
666.97	Concrete 64	
667	Dyeing 64, 104, 249	
669	Metallurgy 28, 64, 80, 104, 128, 152, 176, 192, 208, 224, 249	
674	Wood 64, 192, 208	
675	Leather 249	
676	Paper 44, 104, 176, 208, 249	
677	Textiles 28, 44, 64, 80, 128, 152, 176, 192, 224, 249	
678	Rubber 44, 64, 80, 128, 152, 176, 249	
679.5	Plastics 44, 64, 80, 104, 152, 176, 192, 208, 224, 249	
681.14	Calculating machines 28	
681.4	Optical instruments 128	
681.8	Musical instrument making 176	
72	Architecture 249	
75	Painting 80	
77	Photography 28, 64, 80, 104, 128, 152, 176, 192, 208, 224, 249	
786	Keyboard instruments 249	
788	Wind instruments 192	
797.5	Gliding 192	
Author Index		229
Subject Index		258

ERRATA

Abstr. 899, line 2; *for* Bondi, *read* Biondi.
Abstr. 1194, line 1; *for* 539.531 : 539.016.3 : 620.1, *read* 539.531 : 539.4.016.3 : 620.1
Abstr. 1268, line 9; *for* seasonable, *read* seasonal.
Abstr. 1508, line 3; *for* Novotny, *read* Nowotny.
Abstr. 2149, line 1; *for* 532.133 : 532.79 *read* 532.133 : 532.77
Page 93, line 37, col. 2; *for* 539.016.3 : 620.1 : 539.531, *read* 539.4.016.3 : 620.1 : 539.531

LIST OF JOURNALS

kust. Z.	Akustische Zeitschrift. Leipzig.
mer. J. Phys.	American Journal of Physics. New York.
mer. J. Roentgenol. and Radium Ther.	American Journal of Roentgenology and Radium Therapy. Springfield, Ill.
mer. J. Sci.	American Journal of Science. New Haven, Conn.
nn. Astrophys. Obs. Smithson. Instn	Annals of the Astrophysical Observatory of the Smithsonian Institution. Washington, D.C.
nn. Harv. Coll. Obs.	Annals of the Harvard College Observatory. Cambridge, Mass.
nn. N.Y. Acad. Sci.	Annals of the New York Academy of Science. New York.
nn. Phys., Lpz.	Annalen der Physik. Leipzig.
nn. Solar Phys. Obs.	Annals of the Solar Physics Observatory. Cambridge.
rch. Elektrotechn.	Archiv für Elektrotechnik. Berlin.
rch. Sci. Phys. Nat.	Archives des Sciences Physiques et Naturelles. Geneva.
rch. techn. Messen	Archiv für technisches Messen. Munich.
rch. Wärmew.	Archiv für Wärmewirtschaft und Dampfkesselwesen. Berlin.
rk. Mat. Astr. Fys.	Arkiv för Matematik Astronomi och Fysik. Stockholm and London.
sea J.	ASEA Journal. Västerås, Sweden; and London.
strophys. J.	Astrophysical Journal. Chicago.
viation	Aviation. New York.
.W.A. Techn. Rev. (Amal. Wireless Aust.)	Amalgamated Wireless (Australasia) Technical Review. Sydney.
eama J.	Beama Journal. London.
ell Lab. Rec.	Bell Laboratories Record. New York.
ell Syst. Techn. J.	Bell System Technical Journal. New York.
ell Teleph. Mag.	Bell Telephone Magazine. New York.
rit. J. Radiol.	British Journal of Radiology. London.
rit. Plast. Mould. Prod. Tr.	British Plastics and Moulded Products Trader. London.
rown Boveri Rev.	Brown Boveri Review. London.
TH Activ. (British Thomson-Houston)	BTH Activities. Rugby.
ull. Acad. Sci. Georgian SSR.	Bulletin of the Academy of Sciences of the Georgian SSR. Abastumani, Georgia.
ull. Amer. Met. Soc.	Bulletin of the American Meteorological Society. Milton, Mass.
ull. Amer. Soc. Test. Mater.	Bulletin of the American Society for Testing Materials. Philadelphia, Pa.
ull. Ass. Suisse Élect.	Bulletin de l'Association Suisse des Électriciens. Zürich.
ull. Calcutta Math. Soc.	Bulletin of the Calcutta Mathematical Society. Calcutta and Cambridge.
ull. Harv. Coll. Obs.	Bulletin of the Harvard College Observatory. Cambridge, Mass.
ull. Hydro-elect. Pwr Comm. Ont.	Bulletin of the Hydro-electric Power Commission of Ontario. Toronto.
ull. Lick Obs.	Bulletin of the Lick Observatory. Berkeley, Cal.
ull. Math. Biophys.	Bulletin of Mathematical Biophysics. Chicago.
ull. Oerlikon	Bulletin Oerlikon. London.
ull. Seism. Soc. Amer.	Bulletin of the Seismological Society of America. Berkeley, Cal.
ull. Univ. Ill. Engng Exp. Sta.	Bulletin of the University of Illinois Engineering Experiment Station. Urbana, Ill.
ull. U.S. Bur. Min.	Bulletin of the Bureau of Mines. Washington, D.C.
anad. J. Res.	Canadian Journal of Research. Ottawa.
arnegie Instn Yearb.	Carnegie Institution Yearbook. Washington, D.C.
irc. Harv. Coll. Obs.	Circular of the Harvard College Observatory. Cambridge, Mass.
irc. Un. Obs., Johannesb.	Circular of the Union Observatory of South Africa. Johannesburg.
irc. Univ. Ill. Engng Exp. Sta.	Circulars of the University of Illinois Engineering Experiment Station. Urbana, Ill.
irc. U.S. Bur. Stand.	Circular of the National Bureau of Standards. Washington, D.C.
limatol. Data, W. Indies	Climatological Data. Washington, D.C.
olliery Engng	Colliery Engineering. London.
ommunications	Communications. New York.
ontr. Soc. Res. Meteorites	Contributions of the Society for Research on Meteorites. Los Angeles.
.R. (Doklady) Acad. Sci. U.R.S.S.	Comptes Rendus (Doklady) de l'Acad. des Sciences de l'U.R.S.S. Moscow.
urr. Sci.	Current Science. Bangalore.
istrib. Elect.	Distribution of Electricity. Leeds.
con. Pap. U.S. Bur. Min.	Economic Papers of the Bureau of Mines. Washington, D.C.
con. Proc. Roy. Dublin Soc.	Economic Proceedings of the Royal Dublin Society. Dublin and London.
lect. Commun.	Electrical Communication. New York and London.
lect. Engng, N.Y.	Electrical Engineering. New York.
lect. Rev., Lond.	Electrical Review. London.
lect. Times	Electrical Times. London.
lect. World, N.Y.	Electrical World. New York and London.
lectrician	Electrician. London.
lectronic Engng	Electronic Engineering. London.
lectronics	Electronics. New York and London.
lektrizität i. Bergbau	Elektrizität im Bergbau. Munich.
lektroschweissung	Die Elektroschweissung. Brunswick.
ndeavour	Endeavour. London.
ngineer, Lond.	Engineer. London.
ngineering	Engineering. London.
ngl. Elect. J.	The English Electric Journal. Stafford, England.
ngng Boil. Ho. Rev.	Engineering and Boiler House Review. London.
ngng J. Can.	The Engineering Journal. Montreal.
ngng Suppl. Siemens Mag.	Engineering Supplement to Siemens Magazine. London.
NT [Elekt. Nachr.-Techn.]	Elektrische Nachrichten-Technik. Berlin.
TZ [Elektrotechn. Z.]	Elektrotechnische Zeitschrift. Berlin.
uM [Elektrotechn. u. Maschinenb.]	Elektrotechnik und Maschinenbau. Vienna.

Flugwehr	Flugwehr und Technik. Zürich.
Forsch. IngWes.	Forschung auf dem Gebiete des Ingenieurwesens. Ausgabe B. Berlin.
Found. Tr. J.	Foundry Trade Journal. London.
Fuel in Sci. and Pract.	Fuel in Science and Practice. London.
G.E.C.J. [Gen. Elect. Co.]	G.E.C. Journal. London.
Gemmologist	Gemmologist. London.
Gen. Elect. Rev.	General Electric Review. New York and London.
Geol. Mag. Lond.	The Geological Magazine. Hertford, England.
Geophysics	Geophysics. Austin, Texas.
Handb. U.S. Bur. Stand.	Handbook of the National Bureau of Standards. Washington, D.C.
Harv. Met. Stud.	Harvard Meteorological Studies. Milton, Mass.
Helv. Phys. Acta	Helvetica Physica Acta. Basle.
Hochfrequenztechn. u Elektroakust.	Hochfrequenztechnik und Elektroakustik. Leipzig.
Illum. Engng, N.Y.	Illuminating Engineering. Baltimore, Md.
Indian J. Phys.	Indian Journal of Physics and Proceedings of the Indian Association for the Cultivation of Science. Calcutta.
Industr. Engng Chem.	Industrial and Engineering Chemistry. Washington, D.C.
Industr. Engng Chem. (Analyt. Edit.)	Industrial and Engineering Chemistry (Analytical Edition). Washington, D.C.
Industr. Engng Chem. News Bull.	Industrial and Engineering Chemistry News Bulletin. Washington, D.C.
Iron Age	Iron Age. New York.
Iron Coal Tr. Rev.	Iron and Coal Trades Review. London.
Iron and Steel	Iron and Steel. Chicago.
J. Acoust. Soc. Amer.	Journal of the Acoustical Society of America. New York.
J. Aero. Sci.	Journal of Aeronautical Sciences. Easton, Pa.
J. Amer. Chem. Soc.	Journal of the American Chemical Society. Easton, Pa.
J. Appl. Mech.	Journal of Applied Mechanics. New York.
J. Appl. Phys.	Journal of Applied Physics. New York.
J. Chem. Phys.	Journal of Chemical Physics. New York.
J. Chem. Soc.	Journal of the Chemical Society. London.
J. Electrodepos. Techn. Soc.	Journal of the Electrodepositors' Technical Society. London.
J. Franklin Inst.	Journal of the Franklin Institute of the State of Pennsylvania. Lancaster and Philadelphia, Pa.
J. Inst. Fuel	Journal of the Institute of Fuel. London.
J. Inst. Met.	Journal of the Institute of Metals. London.
J. Inst. Petrol.	Journal of the Institute of Petroleum. London.
J. Instn Auto. Engrs	Journal of the Institution of Automobile Engineers. London.
J. Instn Civ. Engrs	Journal of the Institution of Civil Engineers. London.
J. Instn Elect. Engrs	Journal of the Institution of Electrical Engineers. London.
J. Instn Engrs, Aust.	Journal of the Institution of Engineers, Australia. Sydney.
I. Instn Heat Vent. Engrs	Journal of the Institution of Heating and Ventilating Engineers. London.
J. Iron Steel Inst.	Journal of the Iron and Steel Institute. London.
J. Jr. Instn Engrs	Journal of the Junior Institution of Engineers. London.
J. Mater. Test., U.S.S.R.	Journal of Material Testing, U.S.S.R.
J. Math. Phys.	Journal of Mathematics and Physics. Cambridge, Mass.
J. Mysore Univ.	Journal of the Mysore University. Bangalore.
J. Opt. Soc. Amer.	Journal of the Optical Society of America. New York.
J. Phys. Chem.	Journal of Physical Chemistry. Baltimore, Md., and London.
J. Phys., U.S.S.R.	Journal of Physics. Moscow and London.
J. Proc. Instn Mech. Engrs, Lond.	Journal and Proceedings of the Institution of Mechanical Engineers. London.
J. Res. Nat. Bur. Stand., Wash.	Journal of Research of the National Bureau of Standards. Washington, D.C.
J. Roy. Astr. Soc. Can.	Journal of the Royal Astronomical Society of Canada. Toronto.
J. Roy. Soc. Arts	Journal of the Royal Society of Arts. London.
J. Sci. Instrum.	Journal of Scientific Instruments. Reading.
J. Soc. Automot. Engrs, Phila.	Journal of the Society of Automotive Engineers. Philadelphia, Pa.
J. Soc. Chem. Ind., London	Journal of the Society of Chemical Industry, London.
J. Soc. Dy. Col., Bradford	Journal of the Society of Dyers and Colourists. Bradford.
J. Soc. Glass Technol.	Journal of the Society of Glass Technology. Sheffield.
J. Techn. Phys., U.S.S.R.	Journal of Technical Physics, U.S.S.R. Moscow.
J. Televis. Soc.	Journal of the Television Society. Newbury, Berks.
J. Text. Inst.	Journal of the Textile Institute. Manchester.
J. Univ. Bombay	Journal of the University of Bombay. Bombay.
J. Wash. Acad. Sci.	Journal of the Washington Academy of Sciences. Menasha, Wis.
Kolloid-Beih.	Kolloid-Beihefte. Dresden-Blasewitz.
Kolloid Z.	Kolloid Zeitschrift. Dresden-Blasewitz.
Kunststoffe	Kunststoffe. Munich.
Laboratory	Laboratory. Pittsburgh.
Licht	Licht. Berlin.
Light and Ltg	Light and Lighting. London.
Luftfahrtforsch.	Luftfahrtforschung. Munich.
Machinist	Machinist. London.
Marine Engr, Lond.	Marine Engineer. London.
Mech. Engng, N.Y.	Mechanical Engineering. New York.
Mech. World	Mechanical World. Manchester and London.
Mem. India Met. Dep.	Memoirs of the India Meteorological Department. Simla.
Mem. Manchr Lit. Phil. Soc.	Memoirs and Proceedings of the Manchester Literary and Philosophical Society. Manchester.
Met. Z.	Meteorologische Zeitschrift. Brunswick.
Metal Ind., Lond.	Metal Industry. London.
Metal Progr.	Metal Progress. Cleveland, Ohio.

Metal Treatm.	Metal Treatment. High Wycombe, Bucks.
Metallurgia, Manchr	Metallurgia. Manchester.
Metals and Alloys	Metals and Alloys. Easton, Pa.
Metrop.-Vick. Gaz.	Metropolitan-Vickers Gazette. Manchester.
Min. Elect. Mech. Engr	Mining Electrical and Mechanical Engineer. Manchester.
Min. Mag.	Mines Magazine. Denver, Col.
Misc. Publ. U.S. Bur. Stand.	Miscellaneous Publications of the National Bureau of Standards. Washington, D.C.
Mod. Refrig.	Modern Refrigeration. London.
Mon. Not. Geophys. Suppl. Roy. Astr. Soc.	Monthly Notices, Geophysical Supplement of the Royal Astronomical Society. London.
Mon. Not. Roy. Astr. Soc.	Monthly Notices of the Royal Astronomical Society. London.
Mon. Weath. Rev., Wash.	Monthly Weather Review. Washington, D.C.
Nature, Lond.	Nature. London.
Naturwissenschaften	Naturwissenschaften. Berlin.
Observatory	Observatory. London.
Oil Col. Tr. J.	Oil and Colour Trades Journal. London.
Pap. Inst. Fuel	Papers of the Institute of Fuel. London.
Pap. Instn Post Off. Elect. Engrs	The Institution of Post Office Electrical Engineers, Printed Papers. London.
Pap. Phys. Oceanogr. Met.	Papers in Physical Oceanography and Meteorology. Cambridge and Woods Hole, Mass.
Paper Tr. J.	Paper Trade Journal. New York and Chicago.
Passngr Transp. J.	Passenger Transport Journal. Biggleswade, Beds.
Phil. Mag.	The London, Edinburgh and Dublin Philosophical Magazine and Journal of Science. London
Philos. Trans.	Philosophical Transactions of the Royal Society of London.
Photogr. J.	Photographic Journal. London.
Phys. in regelmäss. Ber.	Die Physik in regelmässigen Berichten. Leipzig.
Phys. Rev.	The Physical Review. New York.
Phys. Z.	Physikalische Zeitschrift. Leipzig.
Plastics	Plastics. Washington, D.C.
P.O. Elect. Engrs' J.	The Post Office Electrical Engineers' Journal. London.
Power	Power. New York and London.
Proc. Amer. Acad. Arts Sci.	Proceedings of the American Academy of Arts and Sciences. Boston, Mass.
Proc. Amer. Phil. Soc.	Proceedings of the American Philosophical Society. Philadelphia, Pa.
Proc. Amer. Soc. Test. Mater.	Proceedings of the American Society for Testing Materials. Philadelphia, Pa.
Proc. Camb. Phil. Soc.	Proceedings of the Cambridge Philosophical Society. London.
Proc. Cent. Snow Conf.	Proceedings of the Central Snow Conference. East Lansing, Mich.
Proc. Indian Acad. Sci.	Proceedings of the Indian Academy of Sciences. Bangalore.
Proc. Inst. Radio Engrs, N.Y.	Proceedings of the Institute of Radio Engineers. New York.
Proc. Instn Radio Engrs, Aust.	Proceedings of the Institution of Radio Engineers, Australia. Sydney.
Proc. Iowa Acad. Sci.	Proceedings of the Iowa Academy of Sciences, Iowa.
Proc. Leeds Phil. Lit. Soc.	Proceedings of the Leeds Philosophical and Literary Society. Leeds.
Proc. Nat. Acad. Sci., Wash.	Proceedings of the National Academy of Sciences. Washington, D.C.
Proc. Phys. Soc., Lond.	Proceedings of the Physical Society. London.
Proc. Roy. Instn	Proceedings of the Royal Institution of Great Britain. London.
Proc. Roy. Irish Acad.	Proceedings of the Royal Irish Academy. Dublin and London.
Proc. Roy. Soc.	Proceedings of the Royal Society of London. London.
Proc. Roy. Soc. Edinb.	Proceedings of the Royal Society of Edinburgh. Edinburgh and London.
Proc. Roy. Soc. Vict.	Proceedings of the Royal Society of Victoria. Melbourne.
Proc. Univ. Durham Phil. Soc.	Proceedings of the University of Durham Philosophical Society. Newcastle upon Tyne.
Publ. Dom. Astrophys. Obs. Vict., B.C.	Publications of the Dominion Astrophysical Observatory. Victoria, B.C.
Publ. Dom. Obs. Ottawa	Publications of the Dominion Observatory. Ottawa.
Publ. Fac. Cienc. Fis.-Mat. La Plata	Publicaciones de la Facultad de Ciencias Físico-Matemáticas de la Universidad Nacional de la Plata. La Plata.
Quart. J. Roy. Met. Soc.	Quarterly Journal of the Royal Meteorological Society. London.
Radiography	Radiography. London.
Radiology	Radiology. Syracuse, N.Y.
Rayon Text. Mon.	Rayon Textile Monthly. New York.
Rep. Brit. Elect. Allied Industr. Res. Assoc.	Reports of the British Electrical and Allied Industries Research Association. London.
Rep. Phys. Soc. Progr. Phys.	Reports on Progress in Physics. London.
Repr. Univ. Ill. Engng Exp. Sta.	Reprint Series of the University of Illinois Engineering Experiment Station. Urbana, Ill.
Rev. Mod. Phys.	Reviews of Modern Physics. New York.
Rev. Sci. Instrum.	Review of Scientific Instruments. New York.
Rev. Univ. Nac. Tucumán	Revista de la Universidad Nacional de Tucumán. Tucumán, Argentine.
Schweiz. Arch. angew. Wiss. Techn.	Schweizer Archiv für angewandte Wissenschaft und Technik. Solothurn, Switzerland.
Schweiz. Bauztg	Schweizerische Bauzeitung. Zürich.
Sci. and Cult.	Science and Culture. Calcutta.
Sci. Notes India Met. Dep.	Scientific Notes of the India Meteorological Department. Simla.
Sci. Proc. Roy. Dublin Soc.	Scientific Proceedings of the Royal Dublin Society. Dublin and London.
Science	Science. Lancaster, Pa.

Sheet Metal Industr.	Sheet Metal Industries. London.
Sky and Telescope	Sky and Telescope. Cambridge, Mass.
Spec. Publ. U.S. Cst Geod. Surv.	Special Publications of the Coast and Geodetic Survey. Washington, D.C.
Steel	Steel. Cleveland, Ohio.
Students' Quart. J. Instn Elect. Engrs	Students' Quarterly Journal of the Institution of Electrical Engineers. London.
Techn. Not. Nat. Adv. Comm. Aero., Wash.	Technical Notes of the National Advisory Committee on Aeronautics. Washington, D.C.
Techn. Pap. U.S. Bur. Min.	Technical Papers of the Bureau of Mines. Washington, D.C.
Tekn. Tidskr.	Teknisk Tidskrift. Stockholm.
Terr. Magn. Atmos. Elect.	Terrestrial Magnetism and Atmospheric Electricity. Baltimore, Md.
Text. Rec.	Textile Recorder. Manchester.
TFT [Telegr.- Fernspr.- Funk.- u. Fernsehtechn.]	Telegraphen- Fernsprech- Funk- and Fernsehtechnik. Berlin.
Trans. Amer. Inst. Elect. Engrs	Transactions of the American Institute of Electrical Engineers. New York.
Trans. Amer. Soc. Mech. Engrs	Transactions of the American Society of Mechanical Engineers. New York.
Trans. Electrochem. Soc.	Transactions of the Electrochemical Society. New York.
Trans. Faraday Soc.	Transactions of the Faraday Society. London.
Trans. Illum. Engng Soc., Lond.	Transactions of the Illuminating Engineering Society. London.
Trans. Inst. Mar. Engrs	Transactions of the Institute of Marine Engineers. London.
Trans. Instn Engrs Shipb. Scot.	Transactions of the Institution of Engineers and Shipbuilders in Scotland. Glasgow.
Trans. Instn Nav. Archit., Lond.	Transactions of the Institution of Naval Architects. London.
Trans. N.-E. Cst Instn Engrs Shipb.	Transactions of the North-East Coast Institution of Engineers and Shipbuilders. Newcastle upon Tyne.
Trans. Roy. Soc. Can.	Transactions of the Royal Society of Canada. Ottawa.
Trans. Roy. Soc. Edinb.	Transactions of the Royal Society of Edinburgh. Edinburgh and London.
Trans. S. Afr. Inst. Elect. Engrs	Transactions of the South African Institute of Electrical Engineers. Johannesburg.
Underwriters' Lab. Inc. Nat. Board Fire Underwriters, Bull. Res.	Underwriters' Laboratory of the Incorporated National Board of Fire Underwriters, Bulletin of Research. New York.
VDI [Z. Ver. dtsch. Ing.]	Zeitschrift des Vereines deutscher Ingenieure. Berlin.
Vjschr. Naturf. Ges. Zürich	Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich.
Weld. J.	Welding Journal. London.
Westinghouse Engr	The Westinghouse Engineer. East Pittsburgh, Pa.
Wireless Engr	Wireless Engineer. London.
Wireless World	Wireless World. London.
Z. angew. Math. Mech.	Zeitschrift für angewandte Mathematik und Mechanik. Berlin.
Z. Astrophys.	Zeitschrift für Astrophysik. Berlin.
Z. Elektrochem.	Zeitschrift für Elektrochemie und angewandte physikalische Chemie. Berlin.
Z. Fernmeldetechn.	Zeitschrift für Fernmeldetechnik, Werk- und Gerätebau. Munich.
Z. ges. Kälteindustr.	Zeitschrift für die gesamte Kälte-Industrie. Berlin.
Z. Kristallogr.	Zeitschrift für Kristallographie, Kristallgeometrie, Kristallphysik, Kristallchemie. Leipzig.
Z. Metallk.	Zeitschrift für Metallkunde. Berlin.
Z. Phys.	Zeitschrift für Physik. Berlin.
Z. phys. Chem.	Zeitschrift für physikalische Chemie (Abteilungen A und B). Leipzig.
Z. techn. Phys.	Zeitschrift für technische Physik. Leipzig.

ABSTRACTORS

G. E. Allan, D.Sc. C. B. Allsopp, M.A., Ph.D. W. R. Angus, M.A., B.Sc., Ph.D. N. F. Astbury, M.A., F.Inst.P. G. O. Baines, M.A., Ph.D., A.Inst.P. E. H. W. Banner, M.Sc., M.I.E.E., F.Inst.P. F. S. Barton, M.A., B.Sc., F.Inst.P., A.M.I.E.E. G. E. Bell, M.Sc., Ph.D., A.Inst.P. W. G. Bickley, D.Sc. P. H. Bigg, B.Sc. N. M. Bligh, A.R.C.S., A.I.C. F. J. Brislee, D.Sc., F.I.C. L. G. Carpenter, B.A., B.Sc. T. A. Chalmers, B.Sc., Ph.D. F. C. Champion, M.A., Ph.D. J. S. Clark, B.Sc., A.R.C.S., D.I.C. K. M. Constable, B.A., B.Sc. R. Davis, M.Sc. E. H. Dock, M.Sc., A.R.C.S., D.I.C., A.Inst.P. W. E. Duncanson, M.Sc., Ph.D. L. Essen, B.Sc. J. Ewles, M.A. F. T. Farmer, B.Sc.(Eng.), Ph.D. R. C. Fox, Ph.D., B.Sc.(Eng.), A.M.I.E.E. L. E. Furtmüller, Ph.D. A. E. M. Geddes, M.A., D.Sc. W. H. George, M.Sc., Ph.D., F.Inst.P. R. H. Golde, A.M.A.I.E.E. G. Greenwood, M.Sc., A.Inst.P. S. J. Gregg, Ph.D., A.R.C.S. L. Hartshorn, D.Sc., A.R.C.S., D.I.C. A. Harvey, Ph.D., B.Sc., F.Inst.P. H. H. Hodgson, Ph.D., M.A., B.Sc. D. R. Hudson, B.Sc. A. Hunter, Ph.D., D.I.C., F.R.A.S. J. Iball, D.Sc., Ph.D., F.Inst.P. T. I. Jones, M.Sc., Ph.D., A.R.C.S. J. Kaye, B.Sc. L. Kellner, Ph.D. J. E. Keyston, B.Sc., Ph.D. B. J. Leggett, M.R.C.S. A. J. McConnell, D.Sc., F.T.C.D. G. C. McVittie, M.A., Ph.D., F.R.A.S. A. S. D. Maunder, F.R.A.S. A. J. Mee, M.A., B.Sc. A. C. Menzies, M.A., D.Sc. R. E. Neale, B.Sc., A.C.G.I., A.M.I.E.E. R. Neumann, B.Sc. R. Peierls, M.A., Ph.D., D.Sc. R. W. Powell, B.Sc., Ph.D., F.Inst.P. R. S. Read, M.A., B.Sc. W. A. Richardson, O.B.E., B.A., D.Sc., B.Sc(Eng.). J. E. Roberts, Ph.D. E. Rushton, B.Sc. M. G. Say, Ph.D., M.Sc., M.I.E.E. D. Shoenberg, Ph.D. H. G. Solomon, A.C.G.I., M.I.E.E. H. J. H. Starks, Ph.D., A.Inst.P. E. O. Taylor, B.Sc., A.M.I.E.E. J. Thewlis, D.Sc. A. M. Thomas, B.Sc., F.Inst.P., A.M.I.E.E. J. S. G. Thomas, D.Sc. A. E. Tooke, B.Sc., A.M.I.E.E., A.Inst.P. J. W. T. Walsh, M.A., D.Sc., M.I.E.E. W. H. Ward, B.Eng. C. E. Webb, B.Sc., A.C.G.I., D.I.C., A.M.I.E.E. S. Weintroub, M.A., A.Inst.P. A. C. Whiffin, B.Sc., M.Sc.(Eng.). E. E. Widdowson, M.Sc., Ph.D., A.Inst.P. A. Wilkinson, B.Sc. A. P. Wilmshurst, A.C.G.I., A.M.I.E.E. A. B.Wood, D.Sc. W. D. Wright, D.Sc., A.R.C.S., D.I.C.

Editor:
J. A. Wilcken, B.Sc., Ph.D.

NOTE ON THE UNIVERSAL DECIMAL CLASSIFICATION SYSTEM

The complete Tables of the Universal Decimal Classification, used in *Science Abstracts*, are in process of publication by the British Standards Institution as B.S. 1000. The following brief notes, published with the permission of the B.S.I., may serve as a preliminary guide for readers.

The system is based on the conception of the whole of human knowledge as unity, divided into ten domains represented by decimal fractions:

.0	Generalities
.1	Philosophy
.2	Religion
.3	Social sciences
.4	Philology
.5	Pure science
.6	Applied science
.7	Art
.8	Literature
.9	History and geography

On this foundation the system is constructed on the principle of proceeding from the general to the more particular by continued subdivision of the numbers into decimal fractions.

Thus every concept within the domain of Pure Science is represented by a decimal fraction greater than .5 and less than .6, the first groups being

.50	General works on pure science
.51	Mathematics
.52	Astronomy
.53	Physics
.54	Chemistry. Crystallography
.55	Geophysics
.56	Palaeontology
.57	Biology
.58	Botany
.59	Zoology

For convenience the first decimal point is always omitted, but it is essential that it should remain imprinted on the reader's mind. The fact that all the numbers are in reality decimal fractions less than unity determines the arrangement of the numbers in numerical sequence. Thus 526 (meaning .526) precedes 53 (meaning .53) in ascending order.

To indicate a work dealing with two or more subjects independently, the numbers corresponding to these subjects are connected by + signs. Thus

531.754 + 536.62	Measurement of density and of specific heat

More important, and more widely used, is the symbol denoting some functional relation between two or more concepts, expressed by the respective numbers linked by the colon sign.

Thus

537.531	X-rays
535.4	Diffraction
548.0	Crystals
537.531 : 535.4 : 548.0	X-ray diffraction by crystals

Further symbols, for the use of which the reader is referred to B.S. 1000, Vol. 1, Part 1, may be used for indicating form, place, language, etc., e.g.

historical:	538.7(09)	Early geomagnetic instruments
place:	551.524.2(73)	Temperature maps of the United States
language:	548.55 = 3	Monocrystalline tungsten wires (in German)

The arrangement in each monthly issue is numerical, according to the U.D.C. numbers. Cross-references, indicated by compound numbers linked by the colon symbol, are given in their proper places, according to each component number. Thus abstracts with compound indices such as

537.531 : 535.4 : 548.0	X-ray diffraction by crystals

are given under 537.531 X-rays, and quoted again under 535.4 Diffraction, and 548.0 Crystals, so that the subject of the abstract is indicated to the searcher in every one of the three fields.

The following abridged tables of the sections

51	Mathematics
52	Astronomy. Geodesy
53	Physics

are published by permission of the British Standards Institution.

51 MATHEMATICS

511	**ARITHMETIC AND THEORY OF NUMBERS**
511.1	Numeration. Arithmetical operations
.11	Notation
.12	Addition, subtraction, multiplication and division of integers
.13	Factors. Fractions. Decimals. Percentages. Proportion
.14	Extraction of roots. Surds. Imaginaries
.15	Arithmetical use of logarithms
.16	Operations with concrete units
.2	General properties of numbers. Residues
.22	Congruences. Indeterminate analysis of the first degree
.23	Quadratic residues
.24	Complex numbers of the form $a + b\sqrt{-1}$
.28	Theory of prime numbers
.4	Forms. Systems of forms
.5	Indeterminate equations of order higher than the first
.6	Algebraic numbers
511.7	Theory of continued fractions
.8	Transcendental numbers
512	**ALGEBRA**
512.1	Elementary algebraic operations and formulae. Progressions
.14	Binomial formula. Powers of polynomials
.2	Equations and functions of the first and second degree
.3	Theory of equations. Polynomials
.4	Solution of equations by radicals
.5	Rational fractions. Interpolation
.8	Higher algebra
.83	Determinants. Matrices
.86	Linear substitutions. Groups See also 519.4 Theory of groups
.87	Elimination
.88	Invariants and covariants
.89	Theory of forms
.9	Universal algebra. Complex quantities. Vector algebra For differential vector operators see 517.43

513 **GEOMETRY**
513.0 Principles of geometry
.01 Axioms
.02 Analytical treatment
.03 Infinitesimal methods
.1/.2 **Plane geometry**
.11/.15 Triangles
.17 Anharmonic ratio. Homography. Harmonic division. Involution
.18 Quadrilaterals
.19 Polygons
.21/.28 Circles
513.3 **Solid geometry**
.31 Points, planes and straight lines
.34 Polyhedrons
.43 Right cylinder and cone
.44/.47 Spheres. Spherical geometry
.49 Geometrical constructions
.51/.55 Conics
.56/.58 Quadrics
.59 Quadric varieties
.61 Algebraic plane curves
.62 Algebraic surfaces
.63 Algebraic skew curves
.64 Transcendental curves and surfaces
.65 Algebraic twisted curves
.66/.67 Algebraic varieties of order greater than 2
.71 Complexes and congruences. Line geometry
.72 Connexes. Systems of curves, of surfaces and of varieties. Enumerative geometry
.73/.74 Infinitesimal geometry. Kinematic geometry. Trajectories
.75/.77 Transformations
.8 **Various geometries**
.81 Non-Euclidean geometry
.82 Multidimensional geometry
.83 Analysis situs. Topology
514 **TRIGONOMETRY**
515 **DESCRIPTIVE GEOMETRY. PROJECTION. PERSPECTIVE**
516 **ANALYTICAL GEOMETRY. CO-ORDINATES**
517 **ANALYSIS**
.1 General principles
.2 Differential calculus
517.26 Taylor's and Maclaurin's series
.3 Integral calculus
.4 Functional determinants. Differential forms. Differential and integral operators
517.5 **General theory of functions**
.512.2 Fourier series
.512.3 Series of Legendre polynomials
.512.4 Series of Bessel functions
.52 Infinite series. Convergence. Summation
.53 Analytic functions of a complex variable
.54 Conformal representation
.55 Functions of several complex variables
.56 Algebraic, circular, exponential, hyperbolic and other functions
.6 Definite integrals
.61 Gamma functions
.63 Laplace transformations
.7 Elliptic functions
.8 Hyperelliptic functions. Abelian functions. Fuchsians
.9 Differential, integral, functional and finite-difference equations
.949 Theory of finite differences
518 **GRAPHS. METHODS OF CALCULATION. NOMOGRAPHY. TABLES. MATHEMATICAL GAMES AND RECREATIONS**
519 **COMBINATORY ANALYSIS. CALCULUS OF PROBABILITY. CALCULUS OF VARIATIONS. THEORY OF GROUPS. THEORY OF AGGREGATES**
519.1 Combinatory analysis
.21 Calculus of probability
.24 Analysis of statistical data. Means. Standard deviation. Skewness
.25 Statistical regularity. Errors of observation. Probable values
.26 Qualitative observations. Contingencies
.27 Quantitative observations. Sampling. Correlation
519.3 Calculus of variation
.4 Theory of groups, fields and ideals
See also 512.86 Linear substitutions
.5 Theory of aggregates
.53 Theory of measure

52 ASTRONOMY

521 **THEORETICAL ASTRONOMY**
.03 Astrophysics
.04 Astrochemistry
.07 Astrobiology. Habitability of celestial bodies
See also 576.15
.1 Celestial mechanics
.12 Universal gravitation
.13 Problem of 3 bodies. Problem of *n* bodies
.14 Shape of celestial bodies
.15 Rotation of celestial bodies
521.2 Geocentric and heliocentric loci
.25/.29 Co-ordinates
.3 Determination of orbits
.4 Perturbations
.5 Orbital motion of planets
.6 Orbital motion of satellites
.7 Theory of comets
.8 Theory of eclipses, occultations and transits
.9 Theory of aberration, precession and nutation
522 **PRACTICAL ASTRONOMY**
.1 Observatories. Equipment for expeditions
.2 Telescopes
.3 Meridian instruments. Meridian circles
.4 Observation instruments other than meridional
522.5/.6 Auxiliary instruments and apparatus
.7 Spherical astronomy
.9 Sources of error and corrections
523 **DESCRIPTIVE ASTRONOMY**
.1 The Universe. Cosmogony
.2 Solar system
.28 Orreries. Planetaria
.29 Zodiac
.3 The Moon
.4 Planets and their satellites
.5 Meteors. Zodiacal light
.6 Comets
.7 The Sun
523.8 Stars
.81 Position. Parallax. Distance
.82 Magnitude. Colour. Visibility
.83 Proper motion. Rotation
.84 Variable stars. Binaries. Novae
.85 Clusters. Nebulae. Milky Way
.87 Spectra
.877 Physical and chemical constitution of stars
.88 Constellations
.89 Catalogues
.892 Ephemerides
.892.2 Nautical almanacs
.9 Transits. Occultations
524 **COLLECTED TABLES AND ATLASES**
525 **THE EARTH**
.1 Constants

525.11 Mass. Weight. Gravitation
See also
526.7 Measurement of gravity
550.312 Distribution of gravity
.12 Density. Elasticity
See also 550.312 Distribution of density
.13 Dimensions
.14 Shape of the Earth
See also 526.1 Determination of the shape of the Earth
.15 Solar distance. Solar parallax
.2 Physics of the Earth from the astronomical point of view. Cosmic influences
See also
550.3 Geophysics
551.5 Meteorology
.3 Orbit and rotation
.4 Geographical co-ordinates
See also
527 Nautical astronomy
526 Geodesy
.5 Seasons
.6 Tides
.7 Terrestrial atmosphere
See also 551.5 Meteorology

526 **GEODESY. SURVEYING**
526(4/9) Geodetic surveys and reports of different regions
526.1 Theory and determination of the shape of the Earth
.2 Base measurement and apparatus
.3 Geodetic triangulation and levelling
.4/.5 Triangulation calculation
.6 Astronomical determination of geographical co-ordinates
.7 Gravity measurements
.7(4/9) Gravity surveys of different regions
.8 Cartography. Maps and models
.9 Topographical surveying and levelling
.9(4/9) Topographical survey of different regions

527 **NAVIGATION. NAUTICAL ASTRONOMY**

529 **CHRONOLOGY. MEASUREMENT OF TIME**
.1 Sidereal day and solar day
.2 Eras. Years. Months. Weeks
.3/.5 Calendars
.7 Horology. Measurement of time
Clocks and watches see 681.11

53 PHYSICS

Special Analytical Subdivisions

In the section 53 Physics, special analytical subdivisions can be used where no appropriate main subdivisions exist, as follows:—

.01 Theory and nature of the phenomenon
.02 General laws
.03 Production and causes of the phenomenon
.04 Effects
.06 Application
.07 Apparatus
.08 Measurements
.081 Units. Constants. Dimensions
.082/.083 Principles and methods of measurement
.084/.087 Instruments and apparatus. Recording
.088 Errors and corrections

530.1 **GENERAL PRINCIPLES**
.112 The ether
.12 Relativity
.145 Quantum theory
.145.6 Wave mechanics
.15 Action and reaction. Hysteresis
.16 Causality and probability

531/534 **MECHANICS**

531 **GENERAL MECHANICS. MECHANICS OF SOLID AND RIGID BODIES**
See also 534 Vibrations
.01 Mathematical theory
531.1 **Kinematics. Geometry of motion**
.14 Translation. Sliding
.15 Rotation
.18 Relative motion
.19 Statistical mechanics
531.2 **Statics. Forces. Masses. Equilibrium**
.22 Composition and resolution of forces
.23 Moments
.24 Centre of gravity
.25 Graphical and analytical statics
.26 Attraction. Potential
531.3 **Dynamics**
.311 Newton's laws
.312 D'Alembert's principle
.313 Virtual velocities
.314 Least action
.33 Tautochronism. Isochronism
See also 531.53 Pendulum
.35 Central forces
.36/.38 Motion of solid bodies. Rigid dynamics. Stability.
.39 Special problems of dynamics
.4 Work. Friction

531.5 Weight. Gravitation. Ballistics
.51 Laws of universal attraction
.51 : 530.12 Relativity theory of universal attraction
.52 Falling bodies
.53 Pendulum theory
.55/.57 Motion of projectiles
.6 Mechanical energy. Momentum. Impact
531.7 **Measurement of geometric and mechanical quantities**
.71 Length
.72 Surface
.73 Volume
.74 Angles
.75 Mass. Density
.76 Time. Velocity. Acceleration
.77 Angular velocities
.78 Force. Work. Pressure
.8 Theory of machines

532 **MECHANICS OF FLUIDS. HYDROSTATICS. HYDRODYNAMICS**
Hydrostatics in general
.12 Elasticity. Compressibility
.13 Viscosity
.14 Density
.2 Equilibrium of liquids
.3 Equilibrium of immersed and floating bodies
532.5 **Hydrodynamics**
.51 Motion of liquids
.52 Conditions of motion
.522 Orifices
.525 Nozzles. Jets
.527 Vortices
.528 Cavitation
.53 Weirs. Waterfalls
.54 Pipes. Siphons. Canals. Rivers
.55 Energy losses
.57 Hydrometry
.58 Pressure exerted by a liquid in motion. Motion of submerged and floating bodies
.59 Wave motion
532.6 **Surface tension. Capillarity**
.61 Surface tension
.62 Thin films
.63 Capillarity
.64 Angle of contact
.69 Surface activity. Oiliness. Wetting
.7 **Kinetic theory of liquids. Osmosis. Solution**
.71 Osmosis
.72 Diffusion
.73 Solution
.74 Association

532.77 Physical properties of solutions. Vapour pressure, boiling point, freezing point, etc.
.78 Crystallization. Supersaturation
533 **MECHANICS OF GASES. AERODYNAMICS**
.1 Properties of gases
.12 Density
.15 Diffusion
.16 Viscosity
533.2 **Elasticity. Compressibility. Liquefaction. Gas mixtures**
.22 Boyle's law
.24 Liquefaction
.275 Humidity. Hygrometry
.4 Barometers
.5 Rarefied gases. Vacuum technique
533.6 **Aerodynamics. Aeronautics**
.01 Theory
.011 Motion of the air
.013/.015 Dynamics of aircraft
.07 Wind tunnels
533.61/.64 Theory of balloons, kites and airships
.65/.69 Theory of aircraft and aircraft elements
.7 Kinetic theory of gases. Kinetic theory in general
534 **ACOUSTICS. VIBRATIONS**
.01 Theory of vibrations
.1 Vibration of bodies. Excitation and recording of vibrations
.21 Propagation of vibrations
.22 Velocity of propagation
.23 Transmission
.24 Reflection
.25 Refraction
.26 Diffraction
.27 Polarization
.32 Quality. Pitch. Timbre
.321.8 Infrasonic vibrations
.321.9 Ultrasonic vibrations
.37 Damping of vibrations
534.4 Analysis and synthesis of sound
.5 Composition of vibrations
.6 Acoustical measurements
.7 Physiological acoustics. Hearing
.83 Noise. Noise measurement. Noise abatement
.84 Architectural acoustics. Reverberation. Echo
.85 Acoustics of gramophone records
.86 Broadcasting. Sound films
.87 Acoustic signalling
.88 Sound ranging
535 **OPTICS**
.1 Theory of light
.2 **Radiation**
.21 Effects of radiation
.214 Radiation pressure
.215 Photo-electricity
.22 Velocity of light
.23 Energy of radiation. Black-body radiation
.24 Photometry. Intensity of light
.243 Spectrophotometry
535.3 **Propagation. Reflection. Refraction. Absorption**
.31 Geometrical optics
.312 Reflection. Plane mirrors
.313 Curved mirrors. Aberration
.314 Refraction
.315 Prisms
.316 Thin lenses
.317 Thick lenses
.32 Refractive indices. Dispersion
535.33 Spectra in general. Emission spectra
.336 Corpuscular spectra
.338 Composition of spectra. Lines. Bands
.33 Structure of lines
.42 Rotation-vibration spectra
.339 Monochromatic light. Monochromators
.34 Absorption
.342/.343 Absorption spectra
535.345 Transmission through transparent bodies
.347 Dichroism. Pleochroism
.35 Excitation. Extinction
.36 Diffusion
.37 **Luminescence. Fluorescence. Phosphorescence**
.375.5 Raman effect
.39 Vitreous reflection. Metallic reflection
.41 Interference
.42 Diffraction
.43 Scattering. Turbidity. Tyndall effect
535.5 **Polarization. Double refraction**
.51 Production of polarized light
.52 Optical surfaces and axes
.54 Chromatic polarization. Comparators. Crystals
.55 Double refraction produced by strain
.56 Optical rotation
.563 Rotatory power
.568.1 Polarimeters
.58 Rotary dispersion
535.6 **Colour**
.7 **Physiological optics. Vision**
.8 **Optical instruments**
.81 Optical glass. Lenses and prisms
.82 Microscopes
.83 Spectacles. Telescopes
.84 Macrography and micrography
.86 Camera lucida. Periscopes
.87 Mirrors. Reflectors
.88 Projection apparatus
536 **HEAT. THERMODYNAMICS**
.1 Theory
For kinetic theory see 533.7
.2 Conduction. Convection
.3 Action of bodies on heat radiation
.35 Diathermancy
.4 Action of heat on bodies
.41 Dilatation
.42 Change of state. Fusion. Boiling. Vapour pressure
.44 Critical points
.45 Incandescence. High-temperature effects
.46 Combustion. Flames
.48 Low-temperature phenomena
536.5 Temperature measurement and control. Thermometers. Thermostats
.6 Quantity of heat. Calorimetry
.62 Calorimetry
.63 Specific heat
.65 Latent heat
.66 Heat of reaction
536.7 **Thermodynamics**
.71 Change of state. Equations of state
.72 First law. Mechanical equivalent
.73 Second law
.74 Thermodynamic temperature
.75 Entropy
.77 Thermodynamic potential. Phase rule
.78 Joule–Thomson effect
.79 Third law
.8 Theory of heat engines
537 **ELECTRICITY**
.1 Theory
.12 Electrons. Charge and mass of electrons
For emission, reflection, scattering, etc., see 537.533
.13 Protons. Positrons
For emission, reflection, scattering, etc., see 537.534
537.2 **Electrostatics**
.22 Electrification. Distribution of charge
.226 Dielectrics
.1 Permittivity
.3 Dielectric loss
.227 Pyro-electricity
.228.1 Piezo-electricity
.2 Electrostriction
.3 Electric double refraction
.4 Kerr effect
.5 Stark effect
.24 Charge on small particles

537.3 **Electric currents**
.311 Conductivity. Resistance. Impedance
.312 Effects on conductivity
.62 Low-temperature supraconductivity
537.32 Thermo-electricity
.36 Elektrokinematics
.361 Electrocapillarity
.362 Electro-endosmosis
.363 Cataphoresis
537.5 **Electric discharges. Radiations**
.52 Discharge
.53 Radiation
537.531 X-rays
Propagation, reflection, refraction, etc., are classified by colon combination with the appropriate sections of 535
See also
539.26 X-ray examination
548.73 X-ray examination of crystals
621.386 X-ray tubes. X-ray technique
537.533 **Cathode rays. Emission of electrons**
For cathode-ray tubes see 621.385.832
For cathode-ray oscillographs see 621.317.7
For cathode-ray tubes in television see 621.397.3
.71 Reflection
.72 Refraction. Electron optics
For electron microscopes see 621.385.833
.73 Diffraction
.74 Scattering
.75 Absorption. Range
.8 Secondary radiation
.92 Ionization
537.534 **Anode rays. Positive rays other than X-rays**
.71 Reflection
.72 Refraction
.73 Diffraction
.74 Scattering
.75 Absorption. Range
.8 Secondary radiation
537.54 Discharge tubes
For discharge tubes from the engineering point of view see 621.385
For applications in communication engineering see under 621.39
.56 Ionization of gases
.57 Ionization of non-electrolytic liquids and solids
.58 Thermionics
.59 Cosmic rays
537.7 **Electrical measurements**
For measurements in electrical engineering see 621.317
.71 Units
.72 Measurement of various electrical quantities
.74 Instruments

538 **MAGNETISM. ELECTROMAGNETISM**

538.1 Theory
.2 Magnetic properties. Magnetization
.213 Permeability
.214 Susceptibility
.23 Hysteresis
.24 Magnetization
538.3 **Electromagnetism. Electrodynamics**
.5 Inductance. Variable currents. Alternating currents
.52 Inductance. Induction coils
.54 Eddy currents
.55 Alternating currents
538.56 Oscillations. Waves
See also 621.396 Radio communication
538.6 **Effects of or on magnetic fields**
.61 Optical
.615 Zeeman effect
.63 Electrical
.65 Mechanical
.652 Magnetostriction
.66 Thermal
.7 **Terrestrial magnetism**
See also
550.38 Terrestrial magnetism in geophysics
525.2 Physics of the Earth

539.1 **ATOMS. MOLECULES**
.11 Kinetic theory of solids
.13 Structure of molecules
.132 Intramolecular mechanics. Quantum theory of molecules
.133 Molecular dimensions. Moments
.15 Structure of atoms
.152.1 Nucleus. Quantum theory of nucleus
.153 Distribution of electrons. Quantum theory of the atom
.154 Atomic constants. Nuclear charge. Moments
.155 Atomic weight
.2 Isotopes
.4 Number of molecules in gram-molecule
.156 Intra-atomic mechanics
539.16 **Radioactivity**
.08 Measurements of radioactivity. Ion counter. Cloud chamber
.163 Radioactive elements
.2 Spectra. Range. Absorption
.164 Alpha rays
.165 Beta rays
.166 Gamma ras
539.17 **Artificial disintegration of atoms. Artificial nuclear transmutation**
Rays of uncharged particles
.18 Molecular and atomic beams
.181 Neutrons
.185

938.2 **STRUCTURE OF MOLECULAR SYSTEMS**
.211 Surface texture
.213 Amorphism
.214 Plasticity
.215 Pulverulence. Graininess
.216 Schistosity. Lamellar structure. Fibres
.217 Porosity. Permeability
.23 Thin films
.24 Microstructure
.25 Properties revealed by the ultramicroscope
.26 Properties revealed by X-rays. X-ray examination
539.3 **Elasticity. Deformation**
.31 Theory. Internal stresses
.32 Elastic moduli
.37 Deformation in general
.38 Causes of deformation. Yield point. Elastic hysteresis
539.4 **Strength**
.41 Resistance to elastic deformation
.42 Tensile strength
.43 Fatigue strength. Creep strength
539.5 **Material properties influencing deformability**
.501 Rheology
.6 Intermolecular forces
.61 Adhesion. Cohesion
.62 Friction
.8 Mechanical effects of physical phenomena
.893 Very high pressure

54 CHEMISTRY

541	**THEORETICAL CHEMISTRY**
.1	Thermochemistry
.12	Chemical mechanics. Equilibrium. Reaction kinetics. Catalysis
.13	Electrochemistry
.14	Photochemistry
.18	Colloids
.183	Adsorption
.2	Atomic theory
.4	Chemical combination. Compounds
541.5	Valency. Bonds
.6	Chemical structure
.62	Isomerism
.64	Polymerism
.65/.69	Relation between chemical structure and physical properties
542	**EXPERIMENTAL CHEMISTRY**
543/545	**ANALYTICAL CHEMISTRY**
548	**CRYSTALLOGRAPHY**

55 GEOLOGY AND GEOPHYSICS

550.3	Geophysics
.34	Seismology
.37	Terrestrial electricity
.38	Terrestrial magnetism
.4	Geochemistry
.8	Applied geology. Prospecting
551	**GENERAL GEOLOGY. METEOROLOGY. STRATIGRAPHY**
.1	General structure of the earth
.2/.3	Geodynamics
.4	Surface of the globe
.46	Oceanography
551.5	Meteorology. Climatology
.50	Practical meteorology. Observations. Instruments
.51	Structure and mechanics of the atmosphere
.52	Radiation. Temperature
.54	Atmospheric pressure
.55	Wind
.57	Humidity. Cloud. Precipitation
.58	Climatology
.59	Cosmic influences. Visibility. Optical, electrical and acoustic phenomena

ENGLISH EDITION OF THE TABLES OF THE UNIVERSAL DECIMAL CLASSIFICATION

The following Parts are now available:

Vol. 1 Part 1 General Introduction; Auxiliary Tables; Class 0 Generalities. Price 7/6 net.

Vol. 2 Part 1 Classes 50 General Works on Pure Science; 51 Mathematics; 52 Astronomy. Geodesy; 53 Physics. Price 10/– net.

Vol. 2 Part 2 Class 54 Chemistry. Price 10/– net.

Vol. 2 Part 3 Classes 55 Geology. Geophysics; 56 Palaeontology; 57 Biology; 58 Botany; 59 Zoology. Price 10/– net.

These Parts may be obtained from The British Standards Institution, 28 Victoria Street, London, S.W.1.